# Goshe Bado Livelihoods Study – Analysis

<Include map of Goshe Bado kebele here >

<Insert basic Goshe Bado Kebele description here >

### Stratification by Livelihood Benchmarks

The top and bottom 25% of households on the basis of their average livelihood capital asset score are identified. These two strata can be used as a basis for further community diagnostics using other tools (e.g. the PCA or more specific tools such as FEAST / Techfit). The key characteristics of the two strata are summarised below.

### Statistical Typology

Four strata extracted by a cluster analysis on the principal components of the livelihood capital assets data. The key characteristics of the four strata are summarised below.

## Stratification by Livelihood Benchmarks

### Composition of Benchmark Groups

. tabulate benchgroup

**Benchmarking Group**

| Freq. Percent Cum.

------------+-----------------------------------

Top 25% | 15 25.00 25.00

Middle | 29 48.33 73.33

Bottom 25% | 16 26.67 100.00

------------+-----------------------------------

Total | 60 100.00

### Mean Livelihood Scores of Benchmarking Groups

. oneway overall\_live\_score benchgroup,

**Benchmarking Group**

| Summary of overall\_live\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 21.810989 1.6258206 14

Middle | 14.776658 2.0169092 29

Bottom 25% | 9.0048076 1.6900565 16

------------+------------------------------------

Total | 14.880574 4.9414596 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 1225.13634 2 612.568172 179.50 0.0000

Within groups 191.10901 56 3.41266089

------------------------------------------------------------------------

Total 1416.24535 58 24.4180233

Bartlett's test for equal variances: chi2(2) = 1.0446 Prob>chi2 = 0.593

### Mean Financial Capital Scores of Benchmarking Groups

. oneway financial\_score benchgroup, tabulate

**Benchmarking Group**

| Summary of financial\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 17.123809 9.0474727 15

Middle | 11.123153 5.1693936 29

Bottom 25% | 5.1071429 2.876364 16

------------+------------------------------------

Total | 11.019048 7.2915975 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 1118.54594 2 559.272969 15.79 0.0000

Within groups 2018.33035 57 35.4093044

------------------------------------------------------------------------

Total 3136.87629 59 53.1673947

Bartlett's test for equal variances: chi2(2) = 17.5020 Prob>chi2 = 0.000

### Mean Natural Capital Scores of Benchmarking Groups

. oneway natural\_score benchgroup, tabulate

**Benchmarking Group**

| Summary of natural\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 19.415179 5.8790702 14

Middle | 15.446121 3.7054167 29

Bottom 25% | 9.6523438 2.8699202 16

------------+------------------------------------

Total | 14.816737 5.4004742 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 734.262222 2 367.131111 21.48 0.0000

Within groups 957.314844 56 17.0949079

------------------------------------------------------------------------

Total 1691.57707 58 29.1651218

Bartlett's test for equal variances: chi2(2) = 7.7303 Prob>chi2 = 0.021

### Mean Social Capital Scores of Benchmarking Groups

. oneway social\_score benchgroup, tabulate

**Benchmarking Group**

| Summary of social\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 38.066667 7.6650332 15

Middle | 21.386973 5.535091 29

Bottom 25% | 12.972222 3.8553046 16

------------+------------------------------------

Total | 23.312963 10.88217 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 5083.54503 2 2541.77252 76.12 0.0000

Within groups 1903.33139 57 33.3917788

------------------------------------------------------------------------

Total 6986.87642 59 118.421634

Bartlett's test for equal variances: chi2(2) = 6.4728 Prob>chi2 = 0.039

### Mean Human Capital Scores of Benchmarking Groups

. oneway human\_score benchgroup, tabulate

**Benchmarking Group**

| Summary of human\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 33.311111 7.1588426 15

Middle | 23.954023 5.8733336 29

Bottom 25% | 15.3125 4.6843085 16

------------+------------------------------------

Total | 23.988889 8.75329 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 2508.06819 2 1254.03409 35.52 0.0000

Within groups 2012.51689 57 35.3073138

------------------------------------------------------------------------

Total 4520.58508 59 76.6200861

Bartlett's test for equal variances: chi2(2) = 2.5040 Prob>chi2 = 0.286

### Mean Physical Capital Scores of Benchmarking Groups

. oneway physical\_score benchgroup, tabulate

**Benchmarking Group**

| Summary of physical\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 26.7 4.9549868 15

Middle | 16.243842 3.8729136 29

Bottom 25% | 10.040179 4.1856549 16

------------+------------------------------------

Total | 17.203571 7.3955757 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 2200.47083 2 1100.23541 61.09 0.0000

Within groups 1026.507 57 18.0088948

------------------------------------------------------------------------

Total 3226.97783 59 54.6945394

Bartlett's test for equal variances: chi2(2) = 1.1637 Prob>chi2 = 0.559

#### Summary of Differences in Capital Asset Scores amongst Benchmarking Groups

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Benchmarking group | Financial | Natural | Social | Human | Physical | Mean |
| Top 25% | 17.1 | 19.4 | 38.1 | 33.3 | 26.7 | 21.8 |
| Middle | 11.1 | 15.4 | 21.4 | 24.0 | 16.2 | 14.8 |
| Bottom 25% | 5.1 | 9.7 | 13.0 | 15.3 | 10.0 | 9.0 |

### Total family size in Benchmarking Groups

. oneway totalpersons benchgroup, tabulate

| Summary of totalpersons

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | 5.6 2.4142434 15

2 | 5.7586207 2.5725914 29

3 | 5.1875 2.2867371 16

------------+------------------------------------

Total | 5.5666667 2.4312002 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 3.38548851 2 1.69274425 0.28 0.7573

Within groups 345.347845 57 6.05873412

------------------------------------------------------------------------

Total 348.733333 59 5.91073446

Bartlett's test for equal variances: chi2(2) = 0.2707 Prob>chi2 = 0.873

### Ratio of males to females in Benchmarking Groups

. oneway malefemaleratio benchgroup, tabulate

| Summary of malefemaleratio

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | 1.3214286 .85601014 14

2 | 1.1149425 .67228797 29

3 | .89032738 .64267515 16

------------+------------------------------------

Total | 1.1030266 .71645945 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 1.39576493 2 .697882464 1.38 0.2607

Within groups 28.3764551 56 .506722412

------------------------------------------------------------------------

Total 29.77222 58 .513314138

Bartlett's test for equal variances: chi2(2) = 1.4347 Prob>chi2 = 0.488

### Proportion of Active Family Members in Benchmarking Groups

. oneway prop\_active benchgroup, tabulate

**Benchmarking Group**

| Summary of prop\_active

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | .62021165 .15998958 15

Middle | .55476689 .2048563 29

Bottom 25% | .6264881 .24404452 16

------------+------------------------------------

Total | .59025374 .20575448 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .070989197 2 .035494598 0.83 0.4397

Within groups 2.42677017 57 .042574915

------------------------------------------------------------------------

Total 2.49775937 59 .042334905

Bartlett's test for equal variances: chi2(2) = 2.4281 Prob>chi2 = 0.297

#### Summary of Differences in Household Structures amongst Benchmarking Groups

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmarking group | Family size | Ratio of males : females | Proportion of active family members |
| Top 25% | 5.6 | 1.3 | 0.62 |
| Middle | 5.8 | 1.1 | 0.55 |
| Bottom 25% | 5.2 | 0.9 | 0.63 |

### Mean Land Areas Farmed by Benchmarking Group

. oneway landareatotalcultivated benchgroup, tabulate

**Benchmarking Group**

| Summary of Land area - total

| cultivated

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 1.045 .47436047 15

Middle | 1.2344828 .65207135 29

Bottom 25% | 1.1778125 .74083954 16

------------+------------------------------------

Total | 1.172 .63304631 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .355694316 2 .177847158 0.44 0.6492

Within groups 23.2884157 57 .408568696

------------------------------------------------------------------------

Total 23.64411 59 .400747627

Bartlett's test for equal variances: chi2(2) = 2.7352 Prob>chi2 = 0.255

### Areas of non-crop land by Benchmarking Group

. oneway noncropland benchgroup, tabulate

| Summary of noncropland

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .63296666 .4841084 15

2 | .43448276 .35207699 29

3 | .42965625 .27847242 16

------------+------------------------------------

Total | .48281667 .37656401 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .45114063 2 .225570315 1.62 0.2060

Within groups 7.91508632 57 .138861164

------------------------------------------------------------------------

Total 8.36622695 59 .141800457

Bartlett's test for equal variances: chi2(2) = 4.4738 Prob>chi2 = 0.107

### People per ha of cropped land by Benchmarking Group

. oneway peopleperhacropped benchgroup, tabulate

| Summary of peopleperhacropped

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | 7.2892929 6.8909828 15

2 | 6.0178209 4.4563164 29

3 | 4.7139112 2.0160998 15

------------+------------------------------------

Total | 6.009574 4.7841291 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 49.7483116 2 24.8741558 1.09 0.3432

Within groups 1277.7494 56 22.8169536

------------------------------------------------------------------------

Total 1327.49771 58 22.8878916

Bartlett's test for equal variances: chi2(2) = 17.3157 Prob>chi2 = 0.000

#### Summary of Differences in Land Holdings amongst Benchmarking Groups

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmarking group | Total land area cropped (ha) | Area of non-crop land (ha) | People per ha of cropped land |
| Top 25% | 1.05 | 0.63 | 7.3 |
| Middle | 1.23 | 0.43 | 6.0 |
| Bottom 25% | 1.18 | 0.43 | 4.7 |

### Mean Livestock Holding Sizes of Benchmarking Groups

. oneway livestock\_units benchgroup, tabulate

**Benchmarking Group**

| Summary of livestock\_units

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 3.2866666 1.1782958 15

Middle | 3.6862069 1.508245 29

Bottom 25% | 2.74375 1.390908 16

------------+------------------------------------

Total | 3.335 1.4341861 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 9.20530937 2 4.60265469 2.34 0.1056

Within groups 112.151187 57 1.96756469

------------------------------------------------------------------------

Total 121.356497 59 2.05688978

Bartlett's test for equal variances: chi2(2) = 1.0445 Prob>chi2 = 0.593

### Mean Livestock Densities (per ha Land Holding) of Benchmarking Groups

. oneway lives\_density benchgroup, tabulate

**Benchmarking Group**

| Summary of lives\_density

| Mean Std. Dev. Freq.

------------+------------------------------------

Top 25% | 4.3325656 3.8811476 15

Middle | 3.7755694 2.6895797 29

Bottom 25% | 2.4740986 1.8238991 15

------------+------------------------------------

Total | 3.5862962 2.9005164 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 27.9474294 2 13.9737147 1.70 0.1918

Within groups 460.006296 56 8.21439814

------------------------------------------------------------------------

Total 487.953725 58 8.41299527

Bartlett's test for equal variances: chi2(2) = 7.5237 Prob>chi2 = 0.023

### Mean Livestock Densities (per ha Non-crop Land) of Benchmarking Groups

. oneway livesdensitynoncrop benchgroup, tabulate

| Summary of livesdensitynoncrop

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | 6.403953 2.8490205 14

2 | 10.361665 7.2443159 24

3 | 8.4272184 9.1278392 15

------------+------------------------------------

Total | 8.768747 7.098138 53

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 140.938479 2 70.4692393 1.42 0.2510

Within groups 2479.00681 50 49.5801363

------------------------------------------------------------------------

Total 2619.94529 52 50.3835633

Bartlett's test for equal variances: chi2(2) = 14.5347 Prob>chi2 = 0.001

### Ratios of large to small stock in Benchmarking Groups

. oneway largesmallstockratio benchgroup, tabulate

| Summary of largesmallstockratio

benchgroup | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .45093219 .71947773 15

2 | .31596938 .14679497 29

3 | .47869665 .52581057 16

------------+------------------------------------

Total | .39310402 .4572859 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .339921874 2 .169960937 0.81 0.4510

Within groups 11.9975916 57 .210484063

------------------------------------------------------------------------

Total 12.3375135 59 .209110398

Bartlett's test for equal variances: chi2(2) = 45.9292 Prob>chi2 = 0.000

### Mean Livestock Holdings per Family Member of Benchmarking Groups

. oneway lives\_per\_person benchgroup, tabulate

**Benchmarking Group**

| Summary of lives\_per\_person

| Mean Std. Dev. Freq.

------------+------------------------------------

1 | .67443915 .3835285 15

2 | .75546063 .53241061 29

3 | .54957341 .32281058 16

------------+------------------------------------

Total | .680302 .45093308 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .437770815 2 .218885408 1.08 0.3467

Within groups 11.5593273 57 .202795216

------------------------------------------------------------------------

Total 11.9970981 59 .203340646

Bartlett's test for equal variances: chi2(2) = 4.9768 Prob>chi2 = 0.083

#### Summary of Livestock Populations and Densities amongst Benchmarking Groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Benchmarking groups | Livestock population (TLU) | Livestock units / ha land holding | Livestock units / ha non-crop land | Ratio of large : small stock | Livestock units / person |
| Top 25% | 3.3 | 4.3 | 6.4 | 0.45 | 0.67 |
| Middle | 3.7 | 3.8 | 10.4 | 0.32 | 0.76 |
| Bottom 25% | 2.7 | 2.5 | 8.4 | 0.48 | 0.68 |

## Principal Components Analysis

### Financial Capital

. pca z\_FC1\_income\_crop\_c z\_FC2\_income\_forest\_c z\_FC3\_income\_lives\_prod\_c z\_FC4\_income\_lives\_sales\_c z\_FC5\_off\_farm\_income\_c z\_FC6\_savings\_credit\_c z\_FC7\_land\_rentals\_c, components(3)

Principal components/correlation Number of obs = 60

Number of comp. = 3

Trace = 7

Rotation: (unrotated = principal) Rho = 0.7027

--------------------------------------------------------------------------

Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 2.73798 1.53063 0.3911 0.3911

Comp2 | 1.20735 .233813 0.1725 0.5636

Comp3 | .973537 .311972 0.1391 0.7027

Comp4 | .661564 .111974 0.0945 0.7972

Comp5 | .549591 .104843 0.0785 0.8757

Comp6 | .444748 .0195204 0.0635 0.9393

Comp7 | .425228 . 0.0607 1.0000

--------------------------------------------------------------------------

Principal components (eigenvectors)

----------------------------------------------------------

Variable | Comp1 Comp2 Comp3 | Unexplained

-------------+------------------------------+-------------

z\_FC1\_inco~c | 0.4252 0.2595 -0.3352 | .3143

z\_FC2\_inco~c | 0.4193 -0.3689 0.1203 | .3402

z\_FC3\_inco~c | 0.3851 0.4662 -0.1574 | .3075

z\_FC4\_inco~c | 0.4381 -0.0651 -0.4650 | .2588

z\_FC5\_off\_~c | 0.3486 -0.1721 0.5470 | .3403

z\_FC6\_savi~c | 0.3662 -0.4678 0.1162 | .3555

z\_FC7\_land~c | 0.2181 0.5714 0.5652 | .1645

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**Interpretation of components**

1. Overall financial well-being (overall impact of financial capital on livelihoods).
2. Livestock products, savings / credit and land rentals as a source of cash flow.
3. Livestock sales and land rental for longer term investment (?).

. screeplot, ci / . loadingplot/ . scoreplot, mlabel(house\_id)



### Natural Capital

. pca NC1\_access\_crop\_land\_c NC2\_quality\_crop\_land\_c NC3\_access\_drinking\_water\_c NC4\_access\_irrigation\_water\_c NC5\_access\_irrigable\_land\_c NC6\_livestock\_numbers\_c NC7\_quality\_livestock\_c NC8\_access\_grazing\_land\_c NC9\_access\_forest\_c NC10\_rainfall\_c NC11\_availability\_stone\_c NC13\_available\_feed\_c NC14\_available\_compost\_c NC15\_access\_inputs\_c NC16\_access\_crop\_vars\_c, components(6)

Principal components/correlation Number of obs = 59

Number of comp. = 6

Trace = 15

Rotation: (unrotated = principal) Rho = 0.7085

--------------------------------------------------------------------------

Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 3.0576 1.11524 0.2038 0.2038

Comp2 | 1.94236 .0640497 0.1295 0.3333

Comp3 | 1.87831 .319196 0.1252 0.4586

Comp4 | 1.55912 .435715 0.1039 0.5625

Comp5 | 1.1234 .0564057 0.0749 0.6374

Comp6 | 1.067 .192056 0.0711 0.7085

Comp7 | .874942 .158902 0.0583 0.7668

Comp8 | .71604 .120118 0.0477 0.8146

Comp9 | .595922 .00192547 0.0397 0.8543

Comp10 | .593997 .15203 0.0396 0.8939

Comp11 | .441966 .0478994 0.0295 0.9234

Comp12 | .394067 .0849021 0.0263 0.9496

Comp13 | .309165 .0266127 0.0206 0.9703

Comp14 | .282552 .119006 0.0188 0.9891

Comp15 | .163546 . 0.0109 1.0000

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Principal components (eigenvectors)

----------------------------------------------------------------------------------------

Variable | Comp1 Comp2 Comp3 Comp4 Comp5 Comp6 | Unexplained

-------------+------------------------------------------------------------+-------------

NC1\_access~c | 0.3775 -0.1460 0.1083 -0.0567 0.3408 0.3577 | .2287

NC2\_qualit~c | 0.3111 -0.0496 0.1284 -0.2426 0.3313 -0.3486 | .3236

NC3\_access~c | 0.3260 0.0936 0.1351 -0.4131 -0.1399 -0.2625 | .2621

NC4\_access~c | 0.2437 -0.3664 -0.4154 0.0397 0.0729 -0.0570 | .2216

NC5\_access~c | 0.2371 -0.4632 -0.3546 0.1128 -0.0357 -0.0391 | .1521

NC6\_livest~c | 0.3266 -0.3204 0.2007 0.0923 -0.1483 0.0430 | .3588

NC7\_qualit~c | 0.2340 -0.0679 0.3345 0.3980 -0.3280 -0.1063 | .2335

NC8\_access~c | 0.2562 0.2833 0.0714 -0.2782 -0.3061 0.3011 | .3112

NC9\_access~c | 0.1908 0.3640 -0.1818 -0.0942 0.0684 -0.2315 | .493

NC10\_rainf~c | -0.0346 -0.1817 0.3790 -0.0736 0.1710 0.5499 | .2984

NC11\_avail~c | 0.0147 0.1697 0.0855 0.6354 0.1691 -0.1281 | .2505

NC13\_avail~c | 0.2386 0.1846 -0.3928 0.0727 0.0731 0.2192 | .4044

NC14\_avail~c | 0.1671 0.3860 -0.2434 0.1686 0.2320 0.3225 | .2982

NC15\_acces~c | 0.2369 0.1412 0.3167 0.1311 0.4484 -0.2097 | .3019

NC16\_acces~c | 0.3645 0.1837 0.0116 0.1992 -0.4493 0.0670 | .2344

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**Interpretation of components**

1. General level of access to natural resources.
2. Importance of irrigable land.
3. Adequacy of water for irrigation.
4. Availability of stone (as a source of income?).
5. Crop varieties and other inputs.
6. Rainfall.

. screeplot, ci / . loadingplot / . scoreplot, mlabel(house\_id)

  

### Social Capital

. pca SC1\_idder\_membership\_c SC2\_coop\_membership\_c SC3\_kebele\_admin\_c SC4\_group\_weight\_c SC5\_debo\_member\_c SC6\_trad\_leadership\_c SC7\_community\_links\_c SC8\_religious\_gatherings\_c SC9\_community\_policing\_c, components(3)

Principal components/correlation Number of obs = 60

Number of comp. = 3

Trace = 9

Rotation: (unrotated = principal) Rho = 0.6535

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Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 4.09436 3.1609 0.4549 0.4549

Comp2 | .933458 .0800913 0.1037 0.5586

Comp3 | .853367 .121617 0.0948 0.6535

Comp4 | .73175 .0612864 0.0813 0.7348

Comp5 | .670464 .0578655 0.0745 0.8093

Comp6 | .612598 .126261 0.0681 0.8773

Comp7 | .486338 .0843111 0.0540 0.9314

Comp8 | .402026 .186388 0.0447 0.9760

Comp9 | .215638 . 0.0240 1.0000

--------------------------------------------------------------------------

Principal components (eigenvectors)

----------------------------------------------------------

Variable | Comp1 Comp2 Comp3 | Unexplained

-------------+------------------------------+-------------

SC1\_idder\_~c | 0.3076 -0.0437 -0.3356 | .5148

SC2\_coop\_m~c | 0.3280 -0.3710 -0.0305 | .4302

SC3\_kebele~c | 0.3969 0.0700 -0.1780 | .3234

SC4\_group\_~c | 0.3488 -0.2952 0.4627 | .2378

SC5\_debo\_m~c | 0.3223 -0.2594 0.5212 | .2801

SC6\_trad\_l~c | 0.3023 0.3412 -0.2103 | .4795

SC7\_commun~c | 0.2238 0.7494 0.4325 | .111

SC8\_religi~c | 0.3881 0.1303 -0.1573 | .3464

SC9\_commun~c | 0.3503 -0.0785 -0.3360 | .3954

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**Interpretation of components**

1. General importance of social cohesion and support
2. General community linkages
3. Specific community institutions providing social or other support

. screeplot, ci / . loadingplot/ . scoreplot, mlabel(house\_id)

  

### Human Capital

. pca HC1\_labour\_c HC2\_health\_c HC3\_education\_level\_c HC4\_skills\_knowledge\_c HC5\_motivation\_c HC6\_family\_size\_c HC7\_confidence\_level\_c HC8\_male\_female\_c HC9\_family\_linkages\_c, components(3)

Principal components/correlation Number of obs = 60

Number of comp. = 3

Trace = 9

Rotation: (unrotated = principal) Rho = 0.6474

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Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 3.25976 1.75537 0.3622 0.3622

Comp2 | 1.50439 .442273 0.1672 0.5294

Comp3 | 1.06212 .260446 0.1180 0.6474

Comp4 | .801674 .135691 0.0891 0.7364

Comp5 | .665983 .141139 0.0740 0.8104

Comp6 | .524845 .0547283 0.0583 0.8688

Comp7 | .470116 .0589949 0.0522 0.9210

Comp8 | .411121 .111136 0.0457 0.9667

Comp9 | .299986 . 0.0333 1.0000

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Principal components (eigenvectors)

----------------------------------------------------------

Variable | Comp1 Comp2 Comp3 | Unexplained

-------------+------------------------------+-------------

HC1\_labour\_c | 0.3075 0.5376 -0.1100 | .2442

HC2\_health\_c | 0.1845 0.5073 0.5136 | .2217

HC3\_educat~c | 0.3420 0.3535 -0.0256 | .43

HC4\_skills~c | 0.3344 -0.2995 0.3287 | .3858

HC5\_motiva~c | 0.3512 -0.3411 0.2972 | .3291

HC6\_family~c | 0.3300 -0.0620 -0.5909 | .2683

HC7\_confid~c | 0.3145 -0.2735 0.2855 | .4785

HC8\_male\_f~c | 0.4090 -0.1971 -0.2892 | .3074

HC9\_family~c | 0.3797 0.0718 -0.1131 | .5088

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**Interpretation of components**

1. Broad impact of human capital assets.
2. Ability to work.
3. Difficulty of keeping larger families fit and healthy.

. screeplot, ci / . loadingplot/ . scoreplot, mlabel(house\_id)

  

### Physical Capital

. pca PC1\_access\_school\_c PC2\_house\_construction\_c PC3\_access\_health\_centre\_c PC4\_transport\_service\_c PC5\_road\_access\_c PC6\_access\_market\_c PC7\_mill\_access\_c PC8\_communication\_device\_c PC9\_access\_electricity\_c PC11\_swc\_structures\_c PC12\_training\_centre\_c PC13\_access\_water\_collection\_c PC14\_nursery\_sites\_c, components(4)

Principal components/correlation Number of obs = 60

Number of comp. = 4

Trace = 13

Rotation: (unrotated = principal) Rho = 0.6275

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Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 4.19496 2.63814 0.3227 0.3227

Comp2 | 1.55683 .145019 0.1198 0.4424

Comp3 | 1.41181 .417696 0.1086 0.5510

Comp4 | .994111 .124075 0.0765 0.6275

Comp5 | .870035 .0508047 0.0669 0.6944

Comp6 | .819231 .063568 0.0630 0.7575

Comp7 | .755663 .106269 0.0581 0.8156

Comp8 | .649394 .160075 0.0500 0.8655

Comp9 | .489319 .0392932 0.0376 0.9032

Comp10 | .450026 .0803897 0.0346 0.9378

Comp11 | .369636 .088729 0.0284 0.9662

Comp12 | .280907 .122825 0.0216 0.9878

Comp13 | .158082 . 0.0122 1.0000

--------------------------------------------------------------------------

Principal components (eigenvectors)

--------------------------------------------------------------------

Variable | Comp1 Comp2 Comp3 Comp4 | Unexplained

-------------+----------------------------------------+-------------

PC1\_access~c | 0.2452 0.1615 0.3483 0.0670 | .5315

PC2\_house\_~c | 0.1083 0.4084 0.1762 0.7213 | .1302

PC3\_access~c | 0.3761 -0.0337 0.0470 0.0297 | .4008

PC4\_transp~c | 0.2774 -0.1186 -0.3120 0.1322 | .5006

PC5\_road\_a~c | 0.3112 -0.2067 -0.1276 0.0030 | .5041

PC6\_access~c | 0.3697 0.0077 -0.2507 0.2523 | .2744

PC7\_mill\_a~c | 0.3461 -0.0936 -0.1091 -0.2039 | .4256

PC8\_commun~c | 0.3059 0.0600 0.2542 -0.0261 | .51

PC9\_access~c | 0.1834 0.0119 0.5487 -0.0319 | .4326

PC11\_swc\_s~c | 0.2883 -0.1981 0.2486 -0.3551 | .3775

PC12\_train~c | 0.3546 -0.0727 -0.2218 0.0346 | .3937

PC13\_acces~c | 0.1029 0.5417 -0.4199 -0.1875 | .2148

PC14\_nurse~c | 0.0986 0.6314 0.0642 -0.4330 | .1464

--------------------------------------------------------------------

**Interpretation of components**

1. Infrastructure (markets / transport / electricity)
2. Nursery sites and water (intensified?)
3. Water and electricity
4. House construction and nurseries (characteristics of better off farmers?)

. screeplot, ci / . loadingplot/ . scoreplot, mlabel(house\_id)

  

## Cluster Analysis

### Generate Clusters

. cluster wardslinkage FC\_comp1 FC\_comp2 FC\_comp3 NC\_comp1 NC\_comp2 NC\_comp3 NC\_comp4 NC\_comp5 NC\_comp6 SC\_comp1 SC\_comp2 HC\_comp1 HC\_comp2 HC\_comp3 PC\_comp1 PC\_comp2 PC\_comp3 PC\_comp4, name(GosheBadoCluster)

### Dendrogram

. cluster dendrogram GosheBadoCluster, labels(householdid) xlabel(, angle(90) labsize(\*.5)) quick

### 

### Composition of Cluster Groups

. tabulate clus\_group

**Cluster to which household belongs**

clus\_group | Freq. Percent Cum.

------------+-----------------------------------

1 | 6 10.00 10.00

2 | 26 43.33 53.33

3 | 18 30.00 83.33

4 | 10 16.67 100.00

------------+-----------------------------------

Total | 60 100.00

### Distribution of Cluster Groups by Benchmark Groups

. tabulateclus\_group\_idbench\_id, row

**Distribution of cluster groups across benchmarking groups**

| benchgroup

clus\_group | 1 2 3 | Total

-----------+---------------------------------+----------

1 | 0 0 6 | 6

| 0.00 0.00 100.00 | 100.00

-----------+---------------------------------+----------

2 | 2 14 10 | 26

| 7.69 53.85 38.46 | 100.00

-----------+---------------------------------+----------

3 | 6 12 0 | 18

| 33.33 66.67 0.00 | 100.00

-----------+---------------------------------+----------

4 | 7 3 0 | 10

| 70.00 30.00 0.00 | 100.00

-----------+---------------------------------+----------

Total | 15 29 16 | 60

| 25.00 48.33 26.67 | 100.00

+----------------+

| Key |

|----------------|

| frequency |

| row percentage |

+----------------+

### Mean Livelihood Scores of Cluster Groups

. oneway overall\_live\_score clus\_group, tabulate

| Summary of overall\_live\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

1 | 7.6871794 1.1780906 6

2 | 12.192615 2.9175221 25

3 | 18.179487 2.8479559 18

4 | 19.978461 3.6554656 10

------------+------------------------------------

Total | 14.880574 4.9414596 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 946.873061 3 315.624354 36.98 0.0000

Within groups 469.372293 55 8.53404169

------------------------------------------------------------------------

Total 1416.24535 58 24.4180233

Bartlett's test for equal variances: chi2(3) = 5.7226 Prob>chi2 = 0.126

### Mean Financial Capital Scores of Cluster Groups

. oneway financial\_score clus\_group, tabulate

| Summary of financial\_score

| Mean Std. Dev. Freq.

------------+------------------------------------

1 | 4.3809524 2.193993 6

2 | 9.6648353 8.2582743 26

3 | 15.174603 5.6699023 18

4 | 11.042857 5.1468458 10

------------+------------------------------------

Total | 11.019048 7.2915975 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 622.908227 3 207.636076 4.63 0.0058

Within groups 2513.96806 56 44.8922868

------------------------------------------------------------------------

Total 3136.87629 59 53.1673947

Bartlett's test for equal variances: chi2(3) = 10.6693 Prob>chi2 = 0.014

### Mean Natural Capital Scores of Cluster Groups

. oneway natural\_score clus\_group, tabulate

**| Summary of natural\_score**

**| Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 8.25 3.0052038 6**

**2 | 13.56 4.1873243 25**

**3 | 17.722222 4.2552531 18**

**4 | 16.66875 6.9387855 10**

**------------+------------------------------------**

**Total | 14.816737 5.4004742 59**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 484.469626 3 161.489875 7.36 0.0003**

**Within groups 1207.10744 55 21.947408**

**------------------------------------------------------------------------**

**Total 1691.57707 58 29.1651218**

**Bartlett's test for equal variances: chi2(3) = 5.7753 Prob>chi2 = 0.123**

### Mean Social Capital Scores of Cluster Groups

. oneway social\_score clus\_group, tabulate

**| Summary of social\_score**

**| Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 11.203704 3.2129496 6**

**2 | 19 8.546633 26**

**3 | 25.746914 6.9484884 18**

**4 | 37.411111 9.607246 10**

**------------+------------------------------------**

**Total | 23.312963 10.88217 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 3457.65986 3 1152.55329 18.29 0.0000**

**Within groups 3529.21656 56 63.0217243**

**------------------------------------------------------------------------**

**Total 6986.87642 59 118.421634**

**Bartlett's test for equal variances: chi2(3) = 6.1817 Prob>chi2 = 0.103**

### Mean Human Capital Scores of Cluster Groups

. oneway human\_score clus\_group, tabulate

**| Summary of human\_score**

**| Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 14.981481 4.131431 6**

**2 | 20.119658 8.026187 26**

**3 | 29.740741 4.4354483 18**

**4 | 29.1 9.1743435 10**

**------------+------------------------------------**

**Total | 23.988889 8.75329 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 1732.78789 3 577.595962 11.60 0.0000**

**Within groups 2787.79719 56 49.7820927**

**------------------------------------------------------------------------**

**Total 4520.58508 59 76.6200861**

**Bartlett's test for equal variances: chi2(3) = 9.5482 Prob>chi2 = 0.023**

### Mean Physical Capital Scores of Cluster Groups

. oneway physical\_score clus\_group, tabulate

**| Summary of physical\_score**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 7.2380953 3.8805288 6**

**2 | 13.785714 4.1603572 26**

**3 | 20.892857 5.0330988 18**

**4 | 25.428572 7.2052041 10**

**------------+------------------------------------**

**Total | 17.203571 7.3955757 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 1821.0909 3 607.030299 24.18 0.0000**

**Within groups 1405.88693 56 25.1051237**

**------------------------------------------------------------------------**

**Total 3226.97783 59 54.6945394**

**Bartlett's test for equal variances: chi2(3) = 4.9452 Prob>chi2 = 0.176**

#### Summary of Differences in Capital Asset Scores amongst Cluster Groups

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster group | Financial | Natural | Social | Human | Physical | Mean |
| 1 | 4.4 | 8.3 | 11.2 | 15.0 | 7.2 | 7.7 |
| 2 | 9.7 | 13.6 | 19.0 | 20.1 | 13.7 | 12.2 |
| 3 | 15.2 | 17.7 | 25.7 | 29.7 | 20.9 | 18.2 |
| 4 | 11.0 | 16.7 | 37.4 | 29.1 | 25.4 | 20.0 |

### Mean Family Sizes of Cluster Groups

. oneway totalpersons clus\_group, tabulate

**| Summary of totalpersons**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 4.6666667 1.3662601 6**

**2 | 5.8076923 2.4003205 26**

**3 | 5.7777778 2.8399577 18**

**4 | 5.1 2.3309512 10**

**------------+------------------------------------**

**Total | 5.5666667 2.4312002 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 9.35042735 3 3.11680912 0.51 0.6741**

**Within groups 339.382906 56 6.06040904**

**------------------------------------------------------------------------**

**Total 348.733333 59 5.91073446**

**Bartlett's test for equal variances: chi2(3) = 3.1400 Prob>chi2 = 0.371**

### Mean Ratios of Males to Females in of Cluster Group Households

. oneway malefemaleratio clus\_group, tabulate

**| Summary of malefemaleratio**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 1.2222222 .79349205 6**

**2 | .89532968 .56238619 26**

**3 | 1.2481481 .90526579 18**

**4 | 1.3333333 .58333333 9**

**------------+------------------------------------**

**Total | 1.1030266 .71645945 59**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 2.06328939 3 .687763129 1.37 0.2630**

**Within groups 27.7089306 55 .503798739**

**------------------------------------------------------------------------**

**Total 29.77222 58 .513314138**

**Bartlett's test for equal variances: chi2(3) = 5.1599 Prob>chi2 = 0.160**

### Mean Ratios of Active to Inactive Family Members in of Cluster Group Households

. oneway prop\_active clus\_group, tabulate

**| Summary of prop\_active**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | .67301588 .19660766 6**

**2 | .51809164 .21665063 26**

**3 | .6625441 .17935408 18**

**4 | .59809525 .18649544 10**

**------------+------------------------------------**

**Total | .59025374 .20575448 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups .27117005 3 .090390017 2.27 0.0900**

**Within groups 2.22658932 56 .039760524**

**------------------------------------------------------------------------**

**Total 2.49775937 59 .042334905**

**Bartlett's test for equal variances: chi2(3) = 0.7659 Prob>chi2 = 0.858**

#### Summary of Differences in Household Demographics amongst Cluster Groups

|  |  |  |  |
| --- | --- | --- | --- |
| Cluster group | Family size | Males : Females | Economically active : inactive |
| 1 | 4.7 | 1.22 | 0.67 |
| 2 | 5.8 | 0.90 | 0.52 |
| 3 | 5.8 | 1.25 | 0.66 |
| 4 | 5.1 | 1.33 | 0.59 |

### Mean Land Areas Farmed of Cluster Groups

. oneway landareatotalcultivated clus\_group, tabulate

**| Summary of Land area - total**

**| cultivated**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 1.1491667 .70746319 6**

**2 | 1.1615385 .6160045 26**

**3 | 1.2597222 .5778471 18**

**4 | 1.055 .79563043 10**

**------------+------------------------------------**

**Total | 1.172 .63304631 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups .281377093 3 .093792364 0.22 0.8787**

**Within groups 23.3627329 56 .417191659**

**------------------------------------------------------------------------**

**Total 23.64411 59 .400747627**

**Bartlett's test for equal variances: chi2(3) = 1.4300 Prob>chi2 = 0.699**

### Mean Non-crop Land Areas of Cluster Groups

. oneway noncropland clus\_group, tabulate

| Summary of noncropland

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .54158333 .37016894 6

2 | .42596154 .31150689 26

3 | .52191667 .48704445 18

4 | .525 .34520525 10

------------+------------------------------------

Total | .48281667 .37656401 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .150079185 3 .050026395 0.34 0.7958

Within groups 8.21614777 56 .146716924

------------------------------------------------------------------------

Total 8.36622695 59 .141800457

Bartlett's test for equal variances: chi2(3) = 4.1984 Prob>chi2 = 0.241

### People per ha of cropped land by Benchmarking Group

. oneway peopleperhacropped clus\_group, tabulate

| Summary of peopleperhacropped

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | 3.7938548 .75128871 5

2 | 5.7156177 2.7430541 26

3 | 4.9708471 2.229538 18

4 | 9.7514285 9.8115431 10

------------+------------------------------------

Total | 6.009574 4.7841291 59

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 186.229643 3 62.0765475 2.99 0.0386

Within groups 1141.26807 55 20.7503286

------------------------------------------------------------------------

Total 1327.49771 58 22.8878916

Bartlett's test for equal variances: chi2(3) = 47.9084 Prob>chi2 = 0.000

#### Summary of Differences in Land Holdings amongst Cluster Groups

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmarking group | Total land area cropped (ha) | Area of non-crop land (ha) | People per ha of cropped land |
| 1 | 1.15 | 0.54 | 3.8 |
| 2 | 1.16 | 0.43 | 5.7 |
| 3 | 1.26 | 0.52 | 5.0 |
| 4 | 1.05 | 0.53 | 9.8 |

### Mean Livestock Holding Sizes of Cluster Groups

. oneway livestock\_units clus\_group, tabulate

**| Summary of livestock\_units**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 2.75 1.2739702 6**

**2 | 3.3115384 1.4517099 26**

**3 | 3.4166666 1.4987249 18**

**4 | 3.6 1.4712051 10**

**------------+------------------------------------**

**Total | 3.335 1.4341861 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 2.88996151 3 .963320505 0.46 0.7145**

**Within groups 118.466535 56 2.11547384**

**------------------------------------------------------------------------**

**Total 121.356497 59 2.05688978**

**Bartlett's test for equal variances: chi2(3) = 0.1866 Prob>chi2 = 0.980**

### Mean Livestock Densities (per ha Land Holding) of Cluster Groups

. oneway lives\_density clus\_group, tabulate

**| Summary of lives\_density**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 2.0350231 1.2016751 5**

**2 | 3.2544755 1.8202132 26**

**3 | 3.119894 1.7244554 18**

**4 | 6.0641905 5.4628484 10**

**------------+------------------------------------**

**Total | 3.5862962 2.9005164 59**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 80.210128 3 26.7367093 3.61 0.0189**

**Within groups 407.743597 55 7.41351995**

**------------------------------------------------------------------------**

**Total 487.953725 58 8.41299527**

**Bartlett's test for equal variances: chi2(3) = 28.2856 Prob>chi2 = 0.000**

### Mean Livestock Densities (per ha Non-crop Land) Sizes of Cluster Groups

. oneway livesdensitynoncrop clus\_group, tabulate

**| Summary of livesdensitynoncrop**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 6.3969353 4.0642139 6**

**2 | 9.0870262 7.7826219 22**

**3 | 10.034787 8.6806164 16**

**4 | 7.3212011 2.6129607 9**

**------------+------------------------------------**

**Total | 8.768747 7.098138 53**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 80.4858016 3 26.8286005 0.52 0.6721**

**Within groups 2539.45949 49 51.8257039**

**------------------------------------------------------------------------**

**Total 2619.94529 52 50.3835633**

**Bartlett's test for equal variances: chi2(3) = 12.4641 Prob>chi2 = 0.006**

### Mean Ratios of Large to Small Ruminants of Cluster Groups

. oneway largesmallstockratio clus\_group, tabulate

| Summary of largesmallstockratio

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .22334798 .06406711 6

2 | .43159131 .41539808 26

3 | .43081359 .6605523 18

4 | .32701346 .18403228 10

------------+------------------------------------

Total | .39310402 .4572859 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .280691556 3 .093563852 0.43 0.7291

Within groups 12.0568219 56 .215300391

------------------------------------------------------------------------

Total 12.3375135 59 .209110398

Bartlett's test for equal variances: chi2(3) = 28.7193 Prob>chi2 = 0.000

### Mean Livestock Holdings per Family Member of Cluster Groups

. oneway lives\_per\_person clus\_group, tabulate

| Summary of lives\_per\_person

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .64214286 .35549621 6

2 | .58631202 .27579091 26

3 | .67568562 .40170813 18

4 | .95588095 .79736856 10

------------+------------------------------------

Total | .680302 .45093308 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .998244912 3 .332748304 1.69 0.1787

Within groups 10.9988532 56 .196408093

------------------------------------------------------------------------

Total 11.9970981 59 .203340646

Bartlett's test for equal variances: chi2(3) = 17.9093 Prob>chi2 = 0.000

#### Summary of Livestock Populations and Densities amongst Cluster Groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cluster groups | Livestock population (TLU) | Livestock units / ha land holding | Livestock units / ha non-crop land | Ratio of large : small stock | Livestock units / person |
| 1 | 2.8 | 2.0 | 6.4 | 0.22 | 0.64 |
| 2 | 3.3 | 3.3 | 9.1 | 0.43 | 0.59 |
| 3 | 3.4 | 3.1 | 10.0 | 0.43 | 0.68 |
| 4 | 3.6 | 6.1 | 7.3 | 0.33 | 0.96 |

### Mean Cattle Holdings of Cluster Groups

. oneway cows clus\_group, tabulate

| Summary of cows

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .83333333 .40824829 6

2 | 1.8461538 1.0466062 26

3 | 1.8333333 .98518437 18

4 | 1.7 .9486833 10

------------+------------------------------------

Total | 1.7166667 .99305498 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups 5.36538462 3 1.78846154 1.90 0.1407

Within groups 52.8179487 56 .943177656

------------------------------------------------------------------------

Total 58.1833333 59 .986158192

Bartlett's test for equal variances: chi2(3) = 4.6579 Prob>chi2 = 0.199

### Mean Oxen Holdings of Cluster Groups

. oneway livestocknumbersoxen clus\_group, tabulate

**| Summary of Livestock numbers - oxen**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 1.6666667 .81649658 6**

**2 | 1.4230769 .90213422 26**

**3 | 1.5 .85749293 18**

**4 | 1.6 .84327404 10**

**------------+------------------------------------**

**Total | 1.5 .85370578 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups .420512821 3 .14017094 0.18 0.9066**

**Within groups 42.5794872 56 .760347985**

**------------------------------------------------------------------------**

**Total 43 59 .728813559**

**Bartlett's test for equal variances: chi2(3) = 0.1243 Prob>chi2 = 0.989**

### Mean Small Ruminant Holdings of Cluster Groups

. oneway smallruminants clus\_group, tabulate

**| Summary of smallruminants**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 9.8333333 5.1153364 6**

**2 | 8.2692308 5.6466464 26**

**3 | 13.166667 9.3761274 18**

**4 | 10 6.2538877 10**

**------------+------------------------------------**

**Total | 10.183333 7.1674681 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 256.534615 3 85.5115385 1.73 0.1721**

**Within groups 2774.44872 56 49.5437271**

**------------------------------------------------------------------------**

**Total 3030.98333 59 51.3725989**

**Bartlett's test for equal variances: chi2(3) = 6.3140 Prob>chi2 = 0.097**

### Mean Donkey Holdings of Cluster Groups

. oneway livestocknumbersadultdonkeys clus\_group, tabulate

| Summary of Livestock numbers -

| adult donkeys

clus\_group | Mean Std. Dev. Freq.

------------+------------------------------------

1 | .66666667 .51639778 6

2 | .96153846 .59871658 26

3 | .72222222 .57451315 18

4 | .7 .9486833 10

------------+------------------------------------

Total | .81666667 .65072754 60

Analysis of Variance

Source SS df MS F Prob > F

------------------------------------------------------------------------

Between groups .977350427 3 .325783476 0.76 0.5213

Within groups 24.0059829 56 .428678266

------------------------------------------------------------------------

Total 24.9833333 59 .423446328

Bartlett's test for equal variances: chi2(3) = 4.4219 Prob>chi2 = 0.219

### Mean Chicken Holdings of Cluster Groups

. oneway livestocknumberschickens clus\_group, tabulate

**| Summary of Livestock numbers -**

**| chickens**

**clus\_group | Mean Std. Dev. Freq.**

**------------+------------------------------------**

**1 | 4.1666667 1.4719601 6**

**2 | 3.7692308 2.4051227 26**

**3 | 4.0555556 3.4036697 18**

**4 | 5.1 2.4244129 10**

**------------+------------------------------------**

**Total | 4.1166667 2.6623022 60**

**Analysis of Variance**

**Source SS df MS F Prob > F**

**------------------------------------------------------------------------**

**Between groups 12.8901709 3 4.29672365 0.59 0.6217**

**Within groups 405.293162 56 7.2373779**

**------------------------------------------------------------------------**

**Total 418.183333 59 7.08785311**

**Bartlett's test for equal variances: chi2(3) = 5.2770 Prob>chi2 = 0.153**

#### Summary of Livestock Holding Structures amongst Cluster Groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cluster group | Cattle | Draught oxen | Small ruminants | Donkeys | Chickens |
| 1 | 0.8 | 1.7 | 9.8 | 0.7 | 4.2 |
| 2 | 1.8 | 1.4 | 8.3 | 1.0 | 3.8 |
| 3 | 1.8 | 1.5 | 13.2 | 0.7 | 4.1 |
| 4 | 1.7 | 1.6 | 10.0 | 0.7 | 5.1 |

#### Interpretation of Cluster Groups

|  |  |
| --- | --- |
| Cluster group | Interpretation |
| 1 | A relatively small group of the really resource poor, constrained by just about everything. |
| 2 | Relatively labour constrained but not especially resource poor. |
| 3 | Relatively resource rich and financially secure. Some indications of a specialisation in livestock. |
| 4 | Larger, “intensifying” families relatively unconstrained by labour, in this community, these appear to be the most prosperous households. Livestock appear to play a role here. Benefit strongly from social capital. |

All farmers in Goshe Bado clearly face numerous issues that are likely to compromise their ability to intensify. Foremost amongst these would appear to be stable access to NRs. There are also problems with input supply and market information / access. Livestock are highly valued in the community (appearing strongly in the principal components analysis) but many households do not appear to be deriving great benefits from them. Whilst there appears to be a good awareness in the community of the value of water management, it is not clear to what extent they are currently benefiting from innovation in this area. Overall, households in Goshe Bado are probably less differentiated than those we worked with in Bekoji but there are still quite clearly defined groups whose needs are likely to differ significantly. As the basic aim of this exercise was to identify such groups then I think it has given us a solid base to work from.

## Various housekeeping commands

### Label a variable

. label variable family\_size "Total number of family members"

### Re-order dataset

. orderaverage\_cap\_score, before(family\_size)